Enterprise Level Status and Control of Multi-Satellite Operations
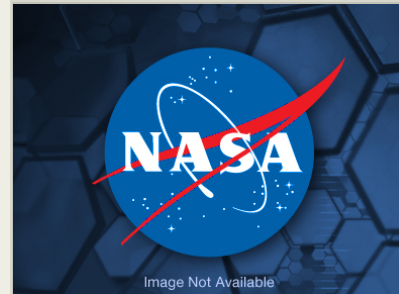
Completed Technology Project (2012 - 2013)

Project Introduction

Single-satellite mission operation centers are used for nearly all Goddard Space Flight Center (GSFC) mission ground data systems, with a focus on localized data distribution. However, as the strategic need to optimize the interoperability, interdependencies, and interrelationship of missions increases, the benefits of enterprise solutions and expanded information accessibility become more apparent. This proposal addresses that need by seeking to create the capacity for ground-based support for very high data rates and extremely large mission data volumes in a secure enterprise environment to allow mission data exchange and aggregation.

The objective of this project is to take information from multiple operational environments and securely deliver it in a graphically useful manner to the end user. This flow of information must be tightly controlled and protected to prevent unintentional leaks of sensitive data prior to receipt by the user. Once the data reaches the user, it must be presented in a useful manner. A simple example of this sort of information would be log messages. A user cannot simply be sent all log messages; the originating system must have the ability to configure which messages will be made available and the end user must be able to filter critical alarm alert messages from mundane logs. The unique challenge of this project is not only its technical feasibility, but also the need to meet GSFC's network security requirements. The capability to move small amounts of data for a single mission with limited security has been demonstrated; however the problem of moving larger amounts of data quickly while keeping the process compliant with GSFC network security practices has not been solved. Work on this IRAD will be performed in collaboration with Goddard Communications and Security Services Division to ensure that all software is in compliance with these GSFC network security requirements. Once the data arrives at its destination it must be strategically presented to maximize its usefulness. There are, of course, many possible applications that can be conceived to meet mission operations needs, such as health and status displays of operational components. The scope of this work will include selecting and implementing a presentation of the data that will be of most benefit to end-users. Based on current knowledge of mission needs, this application will focus on presenting the status of mission operations hardware and software for one or multiple missions. This will allow both the monitoring of single missions and the consolidate aggregation of status information for the monitoring of large portions of the GSFC Satellite Fleet. The key deliverables for the first phase of this proposal are the software transport framework to move data from the operations center to the user, the corresponding web-based application to display the targeted data, and instructions on how to enable and configure the integrated application to ensure compliance with GSFC network security requirements. The compliant framework and web application will be shown in a self-contained demonstration that illustrates the complete and secure flow of information. The resultant software application will also be compliant with the Goddard

Enterprise Level Status and Control of Multi-Satellite Operations

Table of Contents

Tech Port

Printed on 12/08/2022
09:09 AM UTC

For more information and an accessible alternative, please visit:
https://techport.nasa.gov/view/11834

Page 1

Mission Services Evolution Center (GMSEC) architecture. GMSEC is a software-based architecture built on a publish/subscribe messaging framework, which addresses many long-standing issues associated with point-solution implementations of mission control center systems.

Anticipated Benefits

The software produced by this project may be integrated into existing missions to decrease current operating costs, freeing resources for other activities or allowing missions to better adapt to new budgetary requirements. This accomplished through the remote monitoring capability of the software, which allows for more rapid, and therefore less costly, diagnosis of ground system problems. Furthermore, the ability to monitor multiple operations centers through a single port further reduces the burden on operators.

Several existing GMSEC customers, including the Flight Dynamics Facility (FDF) and the Global Precipitation Measurement (GPM) mission ground system, have already expressed a desire for the functionality described herein.

Primary U.S. Work Locations and Key Partners
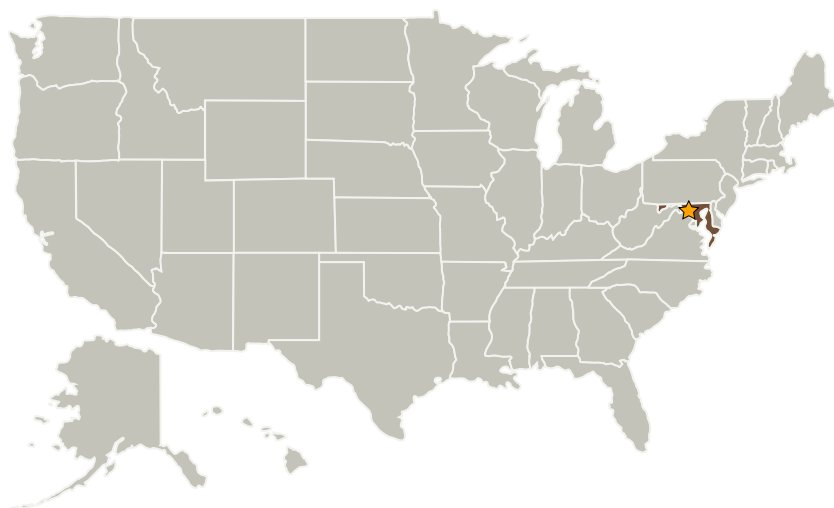
Organizations Performing Work	Role	Type	Location
⭐Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:
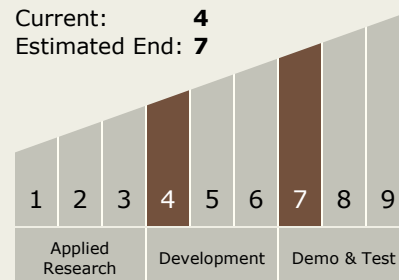
Peter M Hughes

Project Manager:

Jacqueline J Le Moigne-stewart

Principal Investigator:

Matthew E Handy

Technology Maturity (TRL)

Start: **4**
Current: **4**
Estimated End: **7**

1	2	3	4	5	6	7	8	9
Applied Research			Development			Demo & Test		

Primary U.S. Work Locations
Maryland

Project Website:

http://aetd.gsfc.nasa.gov/

Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  └ TX11.4 Information Processing
    └ TX11.4.2 Intelligent Data Understanding